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# P/N: FORD AOD

New Item: (8/94)

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Page Rev. Date: 08-08-94

## FORD AOD AUTOMATIC TRANSMISSION INFORMATION

### USING THE NEW STYLE SHAFT 1988-89:

If you elect to update your AOD output shaft to the newer design that has the additional hole, you must change the valve and spring assembly. We have listed the three different valve and spring assembly part numbers that correspond to the various governor assembly sizes. The information listed below is a direct reprint from the Ford notice concerning AOD Governor Interchangeability.

### **A.O.D. INTERCHANGEABILITY**

*When using this output shaft to service 1983-87 transmission models, rework the governor assembly using the supplied valve and spring assembly kits.*

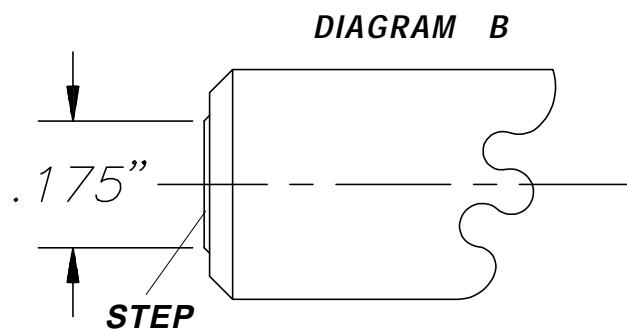
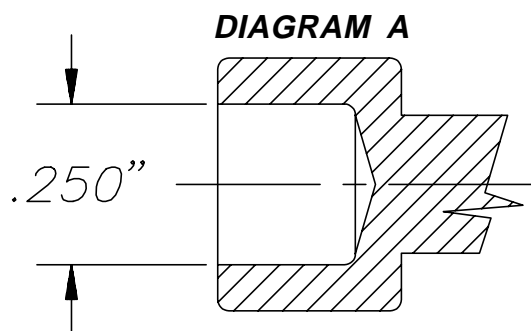
*Identify the governor being reworked and select the proper governor valve and spring kit from the information below.*

### **VALVE & SPRING DIAGRAM**

<b><u>ASSY. KITS</u></b>	<b><u>(See below)</u></b>	<b><u>SPRING COLOR CODE</u></b>	<b><u>VALVE I.D.</u></b>
E7SP-7G495-DA	A	YELLOW	.250 DIA.
E7SP-7G495-CA	A	NONE	.250 DIA.
E7SP-7G495-AA	B	NONE	.175 DIA. STEP.

*For disassembly and assembly of governor, see Volume D, Section 17-20 of the appropriate Car Shop Manual or Volume A, Section 17-20 of the appropriate Truck Shop Manual.*

*To service 1982 and prior models, use new Governor Assy. (-7C063).*



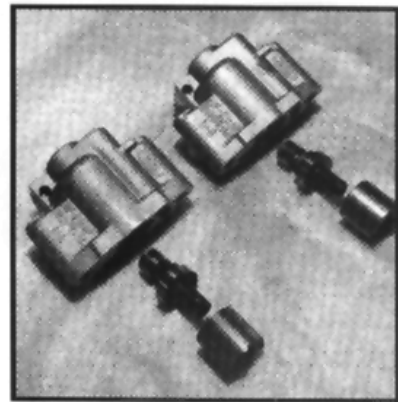
**SPECIAL NOTE:** The components packaged in this kit have been assembled and machined for specific type of conversions. Modifications to any of the components will void any possible warranty or return privileges. If you do not fully understand modifications or changes that will be required to complete your conversion, we strongly recommend that you contact our sales department for more information. This instruction sheet is only to be used for the assembly of Advance Adapter components. We recommend that a service manual pertaining to your vehicle be obtained for specific torque values, wiring diagrams and other related equipment. These manuals are normally available at automotive dealerships and parts stores.



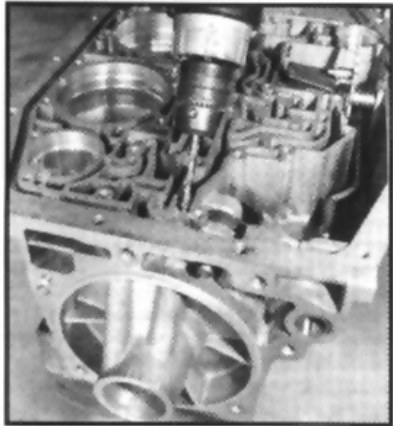
To most people, this may look like a bionic pizza, but it is actually a high-quality rebuild kit from Trans Parts in Sarasota, Florida. This kit contains components from the same manufacturers that supply them for Ford, at a much lower price. A rebuild kit such as this should be the foundation for any transmission build-up, allowing you to start with a "fresh" transmission.



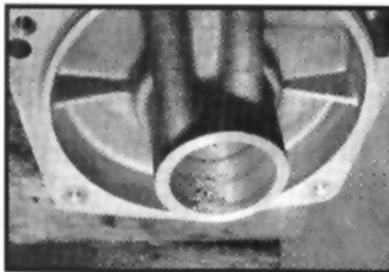
This is something that no one likes to see... fried friction. Our modifications will help prevent this injustice to AOD owners.



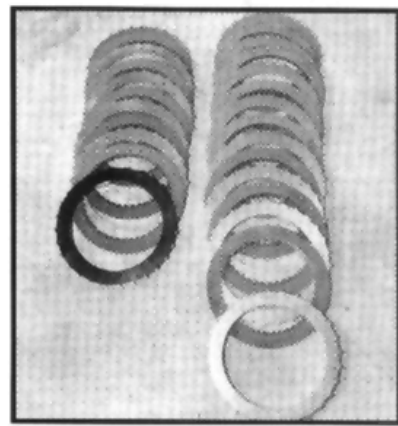
Shown here is the stock governor compared to the Mustang GT assembly. Looking closely, you will notice the valve and spring on the GT unit (top right) are slightly different than the stock unit, allowing slightly higher shift points. The GT governor is included in the Motorsport rear lube kit.



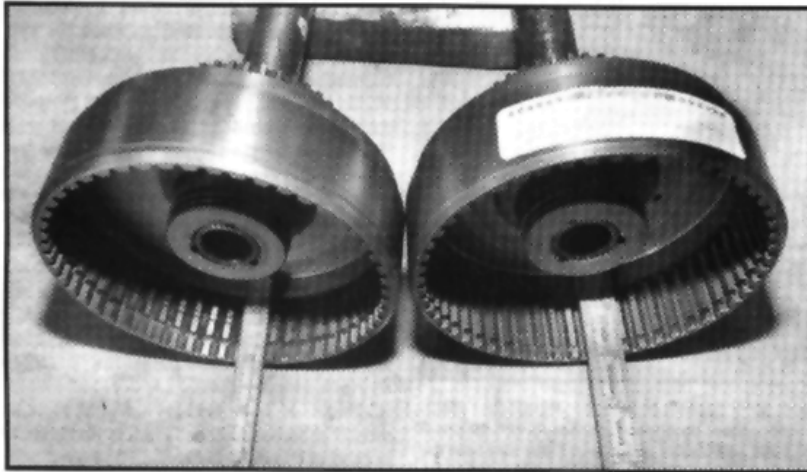
A 1/4-inch drill is being used to counter-bore the governor oil feed passage, allowing the installation of a filter screen supplied with the rear lube kit. The filter is needed because oil from the governor feed circuit is now used for rear lubrication and must be free of debris.



Of course, removal of all debris created by drilling is critical. And while your AOD is apart, be sure to check this bore in the rear of the case for wear. The governor and direct clutch oil feed rings run in here, and the teflon oil ring used in some transmissions may wear deep grooves in the aluminum. If your case is worn, you will either have to replace it or have a transmission shop install a repair sleeve. Fortunately, new cases from Ford are not as expensive as you might think. Be sure to use the cast iron oil rings when reassembling your transmission.



Shown here is the Transco direct clutch pack kit (right) compared to the standard replacement clutch plates. This kit allowed us to use seven clutch friction plates in our five-plate direct clutch cylinder. Note the absence of cross-hatched grooves.



A comparison of forward clutch drums shows the higher groove in the 351 "police" drum (at right) shown by the rulers, which raises the retaining ring, allowing five clutch friction plates to be fitted rather than the usual four.



Installing the clutch pistons can be tricky business indeed, due to the inward facing lip seals (similar to drum brake wheel cylinder cups). The aid of special seal installer tools is a must, but if you are lacking such resources and have tons of patience, you can improvise. Use stripes of thin plastic wrapped around the inside and outside seals to guide them into position. See-through plastic report covers are excellent for this purpose.

### Adapting the AOD to non-stock applications

The AOD will generally bolt into most vehicles, but a few problems may arise. For starters, your stock block plate and flexplate will probably work fine, just be sure that you use the correct flexplate for your engine (small-block Fords are balanced in a variety of ways). Though the transmission crossmember must be moved rearward to fit the rear mount of the AOD, the stock transmission mount will usually work. Moving the crossmember is as simple as changing to a rear set of holes in some vehicles, but may be very involved for other applications, such as unibody cars. The good news is that the drive shaft will seldom need shortening. The short extension housing AOD has the same overall length as most regular Ford automatic and manual transmissions and can even directly replace some of the Japanese-built units used in four-cylinder applications.

Probably the most confusing aspect of adapting an AOD is making the throttle valve (TV) linkage operate correctly. Since the AOD does not use a vacuum modulator to sense engine load (thus determining shift points and shift quality), it must have a direct link to the throttle, allowing it to determine engine load from throttle position, rather than manifold vacuum. For vehicles without multi-port fuel injection, a rod (similar to the kick-down rod used with most other Ford automatics) is used. A common problem that arises when upgrading to a performance carburetor on a factory AOD-equipped vehicle is that the TV rod must operate through the entire through a small portion of its full range. Do not let the similarity with the kick-down rod fool you; it is impossible for the AOD to operate without the TV rod tracking the entire throttle range.

Failure to do so will cause either excessive shift points, a failure to downshift out of overdrive during deceleration (causing engine stall), transmission failure, or

other serious problems.

There are a few methods that can be used to adapt the AOD's TV linkage to a non-stock engine. The first method is to connect the TV rod to the carburetor kick-down linkage while modifying the carburetor linkage to permit travel of the kick-down arm directly with the throttle (i.e. bolt them together). It is critical that you ensure the ratio is correct, resulting in the right amount of travel of the TV lever at the transmission for the entire throttle range. The best way to check this is to compare your new carburetor side-by-side with a stock AOD carb or throttle body. If the distance from the center of the throttle shaft to the TV rod connection point is equal, then the carb will probably work. It is also important that the TC leer on the carb points in about the same direction as the stock unit (for example, if at idle the linkage on the stock carb is pointing to 11 o'clock, the new carb's linkage should also point to 11 o'clock). If the arm on your carburetor will not work, or if it does not have one, you can probably fabricate and attach one, keeping the above parameters in mind. Always be sure to include some way to adjust your linkage.

If a TV rod proves to be difficult or impossible to adapt, you may be able to adapt a TV cable from a multi-port EFI application. You will want to look at several different vehicles in an effort to find a cable length and configuration that best suits your application. Then, order the cable with the correct brackets and transmission lever from your Ford dealer. If the ratio is correct, you may be able to operate the TV cable directly from the accelerator pedal. Other options include the use of brackets in front of the throttle linkage or under the throttle linkage. The cable allows freedom to make special brackets and the like, for use in tight quarters. If you are using a multi-port EFI engine (even if originally equipped with a manual transmission), the stock cable for the application will bolt right on.

## A-OK AOD

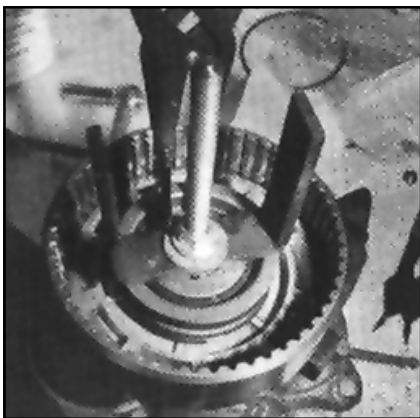
because line pressure (the main fluid pressure, used to apply all clutches and bands), is reduced or "cut-back" in third and fourth gear, when the direct clutch is applied. This durability problem can be solved by increasing the quality and quantity of direct clutch plates, while altering the valve body to eliminate the line pressure "cut back" in third and fourth gears. The heavy duty direct clutch pack kit from Transco allows up to seven friction plates to be fitted to the stock five plate direct clutch drum. If extra durability is needed, Ford makes a six-plate heavy-duty direct drum, used in some 1988 and newer models (Ford part #E8LY-7F283-A), which will accommodate up to eight friction plates. It is especially important to check clutch pack clearance when changing clutch pack components. Selective snap rings, available from Ford, can be used to "dial-in" the correct clearance.

Another weakness of the AOD is the forward clutch, mainly due to difficulties in downshifting out of overdrive. Shifting into overdrive requires the overdrive band to engage as the forward clutch disengages. As a result, a shift out of overdrive (especially under hard throttle) is difficult for the forward clutch, because it has to engage under full power with low line pressure. This causes undue forward clutch wear and sluggish downshifts out of overdrive. Eliminating the line pressure "cut-back," (as mentioned, to improve the direct clutch system) and installing the five plate "police" clutch drum solves these problems. In addition, enlarging the forward clutch apply orifice in the valve body makes the forward clutch engage even faster, thus, keeping destructive slippage to a minimum. However, it is still advisable to keep the shifter in (D) during bonsai runs to lock out overdrive.

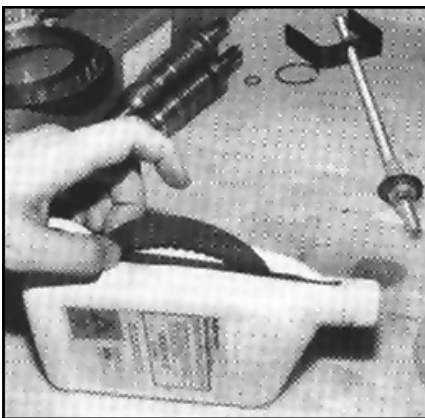
After correcting weak links, the important aspect of building a performance transmission is improving shift feel. Stock transmissions are calibrated to shift slowly, resulting in smooth shifts which give the transmission a seamless "luxo-car" feel. While this may be nice for the average Town Car owner, it is, unfortunately, a detriment to performance enthusiasts. Mechanical features unique to the AOD giving it a potential for driveline snapping shifts unknown to most other Ford transmissions are left hidden by this soft calibration. Fortunately, a few simple valve body revisions (in addition to these previously mentioned) can prevent those power wasting "slush shifts." In addition, these revisions can be done in varying degrees to suit the individual.

The final, but perhaps most important, valve body revision for a performance AOD is raising the shift points. A high-performance engine cannot develop its full potential if the transmission shifts in the middle of the engine's power-band. With shift points around 4500

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*In order to remove and install clutch pistons and return springs, a tool is needed to compress the spring, allowing the retainer to be released safely. This compressor tool was easily fabricated from 7/16-inch threaded rod, washers and a flat steel plate. Be sure to change all clutch piston seals while your transmission is apart, because they fail with age.*



*It is good practice to soak all of your new clutch friction plates in fresh ATF prior to installation. A half-full ATF bottle with a slot cut in the side (as shown) makes a handy tool for soaking your clutch plates. The fabricated compression tool mentioned in the caption at left is shown in the upper right corner of this photo.*

# A-OK AOD

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When changing clutch pack components (i.e., clutch drums or clutch packs) clearance is critical. A simple feeler gauge can be used to check clearance as shown. If clearance is not within shop manual specifications, use another selective snap ring.



Shown are the selective snap rings (foreground) used to set clutch pack clearance and selective thrust washers (background) used for setting geartrain end play. The selective snap rings are available in many thicknesses. Consult your Ford dealer for a full listing.



The motivations for our troubles; a suitably tweaked AOD behind the 5.0L HO swapped into this Ranger pickup will make for one nice little package.

around 4500 rpm (with the high speed governor), the AOD does just that. Since the AOD uses a throttle valve (TV) cable (with a regulated pressure limit), instead of the more familiar vacuum modulator, we cannot adjust full throttle shift points externally. Instead, the "TV limit" valve must be modified to provide an increased maximum TV (anti-shift) pressure to the shift valves. The advantage of this system is that light-to-moderate throttle shift points are not disturbed, thus, maintaining the driveability and fuel efficiency of a stock transmission.

The Motorsport rear lube kit is a necessity for pre-1988 units used in performance applications. This kit, which requires complete transmission disassembly for installation, re-routes rear lube fluid feeding the planetary gears, providing more positive lubrication flow. Unlike conventional transmissions, the lube supply to the planetary gears is critical (especially with low axle ratios and high speeds) because the planetary gears are always working in overdrive. Without adequate lubrication the planetary assembly could fail, resulting in a very expensive repair bill. It is best to think of the rear lube kit as cheap insurance for your AOD.

Upon completing modifications, it was time for a test flight. After a gentle break-in run, we were ready to test the AOD's full potential. The shifts were extremely positive, chirping second and third. However, at 4900 rpm, the shift points were still a little lower than our goal of 5500 rpm. Another fine point was the 1-2 shift, which was actually too hard (that's a switch) for our application (a 5.0L HO Ranger with a weak 7.5-inch rear axle). We made a quick trip back into the valve body and solved these problems, ending up with an incredible performance transmission, and almost no compromises.

The rear lube kit is just the beginning of Motorsport's line of AOD upgrades. Many items are in the works, and soon to be released. A performance valve body, high stall speed torque converter, and a deep sump chrome oil pan are in the works for the AOD. When these goods become available, AOD performance will be better than ever. So stay tuned to WAOD for more information.

If you plan on embarking on your own AOD adventure, be sure that you study the proper section in your Ford shop manual very carefully. Make sure you know what you are planning to do before you do it, and of course, if the job looks too involved, enlist the help of an expert. Further information on the valve body modifications are available by mail and, if demand warrants, a complete kit may be available.

**SF**